

What is Claimed:

1 1. A method of controlling a hydronic system, the hydronic
2 system including a plurality of fluid heat exchange units for feeding a load,
3 and a bypass valve for bypassing fluid flow from the load, the method
4 comprising the steps of:

5 operating at least a first and a second fluid heat exchange unit
6 in the hydronic system to heat or cool a fluid;

7 monitoring an output fluid flow of each of the operating fluid
8 heat exchange units;

9 comparing the monitored output fluid flow to a predetermined
10 fluid flow setpoint;

11 adjusting the output fluid flow of each of the operating fluid heat
12 exchange units towards the predetermined fluid flow setpoint if the
13 monitored output flow is different from the predetermined fluid flow setpoint
14 by at least a predetermined margin;

15 monitoring a combined output fluid flow of the operating fluid
16 heat exchange units;

17 at least partially opening the bypass valve if the combined
18 output fluid flow is below a predetermined minimum combined output fluid
19 flow; and

20 operating a previously idle fluid heat exchange unit if the
21 combined output fluid flow is greater than a predetermined maximum
22 combined output fluid flow for the number of operating fluid heat exchange
23 units.

1 2. The method of claim 1 further comprising the steps of:

2 measuring a temperature of a fluid flowing in a fluid header
3 positioned downstream of the first and second fluid heat exchange units in
4 the hydronic system; and

5 comparing the temperature to a predetermined temperature.

1 3. The method of claim 1 wherein said adjusting step
2 includes adjusting the output fluid flow of each of the operating fluid heat
3 exchange units by varying the speed of a respective adjustable frequency
4 drive, thereby driving the output fluid flow towards the predetermined fluid
5 flow setpoint.

6 4. The method of claim 1 wherein said opening step includes
7 at least partially opening the bypass valve repeatedly by incremental steps
8 until the combined output fluid flow has reached the predetermined minimum
9 combined output fluid flow.

1 5. The method of claim 1 further comprising the step of:

2 increasing a value of the predetermined minimum combined
3 output fluid flow if the combined output fluid flow is below the predetermined
4 minimum combined output fluid flow.

1 6. The method of claim 1 further comprising the step of:

2 opening the bypass valve to at least a partially open position
3 such that stagnation of fluid in the hydronic system is substantially reduced.

1 7. The method of claim 1 wherein said step of monitoring an
2 output fluid flow of each of the operating fluid heat exchange units includes
3 using the combined output fluid flow, and an operating speed of each
4 presently operating fluid heat exchange unit to determine the output fluid
5 flow of each of the operating fluid heat exchange units.

1 8. The method of claim 1 wherein said step of monitoring an
2 output fluid flow of each of the operating fluid heat exchange units includes

3 dividing the combined output fluid flow by a number of presently operating
4 fluid heat exchange units.

1 9. The method of claim 1 wherein said step of operating at
2 least a first and a second fluid heat exchange unit includes operating the first
3 fluid heat exchange unit at a constant flow and operating the second fluid
4 heat exchange unit at a variable flow.

1 10. A hydronic system comprising:

2 a plurality of fluid heat exchange units including at least a first
3 and a second fluid heat exchange unit for feeding a load;

4 a bypass valve for bypassing fluid flow from the load;

5 a plurality of fluid flow monitors, each of the fluid flow monitors
6 monitoring an output fluid flow of a respective fluid heat exchange unit;

7 a combination flow monitor for monitoring a combined output
8 fluid flow of the fluid heat exchange units; and

9 a control system for comparing the monitored output fluid flow
10 of each fluid heat exchange unit to a respective predetermined fluid flow
11 setpoint, the control system adjusting the output fluid flow of each of the
12 operating fluid heat exchange units towards the predetermined fluid flow
13 setpoint if the monitored output flow is different from the predetermined fluid
14 flow setpoint by at least a predetermined margin, the control system
15 providing a command to the bypass valve to at least partially open if the
16 combined output fluid flow is below a predetermined minimum combined
17 output fluid flow, and the control system providing a command to operate a
18 previously idle fluid heat exchange unit if the combined output fluid flow is
19 greater than a predetermined maximum combined output fluid flow for the
20 number of operating fluid heat exchange units.

1 11. The hydronic system of claim 10 wherein said bypass
2 valve is positioned in close proximity to said plurality of chillers.

1 12. The hydronic system of claim 11 wherein said bypass
2 valve is positioned in close proximity to said plurality of heat exchange units
3 at the end of the hydronic system.

1 13. The hydronic system of claim 10 wherein said first fluid
2 heat exchange unit is configured for operation at a constant flow, and said
3 second fluid heat exchange unit is configured for operation at a variable flow.

1 14. The hydronic system of claim 10 wherein said load
2 includes a plurality of air handling units.